BEBR

FACULTY WORKING PAPER NO. 953

An Analytical and Empirical Comparison of Alternative Cost of Equity Capital Estimation Methods

Cheng F. Lee
Charles M. Linke
J. Kenton Zumwalt

College of Commerce and Business Administration
Bureau of Economic and Business Research
University of Illinois, Urbana-Champaign

BEBR

FACULTY WORKING PAPER NO. 953

College of Commerce and Business Administration

University of Illinois at Urbana-Champaign

April 1983

An Analytical and Empirical Comparison of Alternative Cost of Equity Capital Estimation Methods

Cheng F. Lee, Professor
Department of Finance

Charles M. Linke, Professor
Department of Finance

J. Kenton Zumwalt, Associate Professor
Department of Finance

Abstract

Cost of equity capital estimation is an important issue for both regulated and unregulated firms. There are several methods for estimating the cost of equity capital, including: (1) discounted cash-flow methods; (2) capital asset pricing model methods; (3) M&M's cross-sectional method; and (4) integrated methods. This paper reviews the alternative estimation methods and empirically compares three of the most frequently used methods. The results indicate there are no consistent relationships among the three methods analyzed and the results vary across different industries.

I. INTRODUCTION

Cost of equity capital estimation is one of the most important issues in public utility regulation and in capital budgeting decisions. The concept of the cost of capital presents no particular difficulty under conditions of perfect certainty--the assumption on which most of classical theory has been developed. It is simply the market rate of interest. Under conditions of uncertainty, the cost of capital is no longer directly observable and several methods have been developed to estimate the cost of equity capital. These include: (1) the earnings yield method, (2) the discounted cash-flow (DCF) model, (3) the capital asset pricing model (CAPM) method; (4) M&M's [13] cross-sectional estimation method; and (5) integrated methods. The integrated method combines the CAPM with M&M's proposition III in estimating the cost of equity capital. Most recently Glenn and Litzenberger [3] have integrated M&M's cross-sectional method and the CAPM method to propose "an interindustry approach for cost of capital estimation."

The main purposes of this paper are to review the alternative cost of equity capital estimation methods and to empirically compare three of the most frequently used methods. Possible biases related to the application of the CAPM for different industries will also be discussed. In the second section, alternative cost of equity capital estimation methods will be reviewed. In the third section empirical data from both the utility industry and three non-utility industries will be used to estimate empirically the cost of capital using the three most popular alternative methods. Finally, some guidelines for choosing among the alternative cost of capital estimation methods are established in accordance with a compromise of theory and practice.

II. ALTERNATIVE COST OF EQUITY CAPITAL ESTIMATION METHODS: A REVIEW

There are two basic approaches for estimating the cost of equity capital--the discounted cash flow method which is based on the firm's operating and financial characteristics, and the capital asset pricing model method which is based on the relationship between a firm's expected returns and the returns of a market index. There are several alternative specifications under each of these two basic approaches, and each particular specification has its own set of underlying assumptions. This section develops the different models, summarizes the assumptions of each model, and describes the estimation problems associated with each model.

Discounted Cash Flow Methods

The discounted cash flow (DCF) method assumes the market price of an asset, here a common stock, is equal to the present value of expected future cash flows to the suppliers of equity capital, the stockholders. Since cash flows to stockholders come in the form of dividends, the DCF model is

$$P_0 = \frac{D_1}{1 + k_e} + \frac{D_2}{(1 + k_e)^2} + \ldots + \frac{D_\infty}{(1 + K_e)^\infty} \qquad (1)$$

or

$$P_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1 + k_e)^t} \qquad (2)$$

where P_0 is the current observable market price of the stock, $D_1, \ldots, D_\infty$ are the expected future (unobservable) dividends, and k_e is the rate of return necessary to equate expected dividends to the share price and, hence, is the required rate of return or cost of equity capital. Obviously, the crucial problem is the estimation of future dividends and several

alternative specifications have been developed in attempting to simplify the estimation problem.

The earnings-price ratio or <u>earnings yield model</u> simplifies the dividend estimation problem by assuming a 100% dividend payout and no growth in earnings. In this model dividends equal earnings and the earnings constitute a perpetuity. That is:

$$P_0 = \frac{E}{1 + k_e} + \frac{E}{(1 + k_e)^2} + \ldots + \frac{E_\infty}{(1 + k_e)^\infty} \tag{3}$$

which may be simplified to:

$$P_0 = \frac{E}{k_e} \tag{4}$$

or

$$k_e = \frac{E}{P_0} . \tag{5}$$

Here, k_e is the return required on a perpetuity and is the inverse of the familiar price-earnings ratio reported in the financial press. The major problems associated with using the earnings yield as a cost of equity capital measure are the omission of possible earnings growth and dividend policy considerations. It should also be noted that the P/E ratio reported in the financial press is generally based on historical earnings, not expected earnings.

A second DCF specification is the <u>dividend growth model</u>. In this model the dividends in equation (1) are assumed to follow a particular pattern. A pattern frequently used by institutional investors involves dividing the expected dividend stream into three periods based on different growth expectations. This results in:

$$P_0 = \sum_{t=1}^{m} \frac{D_0(1 + g_1)^t}{(1 + k_e)^t} + \sum_{t=m+1}^{n} \frac{D_m(1 + g_2)^{t-m}}{(1 + k_e)^t} + \sum_{t=n+1}^{\infty} \frac{D_n(1 + g_3)^{t-n}}{(1 + k_e)^t} \qquad (6)$$

where g_1 is the expected growth in dividends for the first m years, g_2 is the expected growth for the second n years and g_3 is the growth rate assumed to be constant in perpetuity. Using this specification, the dividends can easily be estimated for the first two terms and the last term approaches $\frac{D_{n+1}}{k_e - g_3}$. With this information and the current market price, the expected rate of return can be calculated.

A similar growth model developed by the Wells Fargo Bank includes estimation of dividends and earnings for the next five years, the expected earnings growth rate and payout ratio for the sixth year, the time when a constant growth rate is expected, the amount of the constant growth rate, and the expected payout ratio when the firm reaches its constant growth.[1] Using this information, dividends are estimated up to the time the firm is expected to achieve its constant growth; the value of the constant growth term is determined; then the expected dividends and constant growth value is used with the current price to determine the stock's expected return.

Probably the most widely used specification of equation (1) is:

$$P_0 = \sum_{t=1}^{\infty} \frac{D_0(1 + g)^t}{(1 + k_e)^t} . \qquad (7)$$

The crucial assumptions for this model are that the dividend growth rate, g, will be constant forever and that k_e is greater than g. This model also generally assumes a firm's earnings are growing at the rate g and that the payout ratio and P/E ratio are constant. This allows the model to be simplified to:

$$P_0 = \frac{D_1}{k_e - g} \tag{8}$$

or

$$k_e = \frac{D_1}{P_0} + g \tag{9}$$

where D_1 is the expected dividend, P_0 is the current stock price, and g is the expected growth in earnings/dividends.

The obvious difficulty faced in applying any DCF model involves the estimation of future dividends or the expected growth rate(s) in future dividends. Whether the analyst is using a specification such as the Wells Fargo model which requires actual dividend estimates for a number of years or a specification such as the constant growth model which requires an estimate of the constant growth term, assumptions must be made regarding the general economic outlook and the outlook for the markets in which the firm competes.

M&M's Cross-Sectional Model

M&M's proposition 2 deals with the cost of capital determination. In their 1966 AER article, they extended their proposition 1 with taxes and growth potential and proposed a cross-sectional cost of capital model. Following M&M [14], proposition 1 (with taxes but without growth) can be defined as

$$V_L = V_u + \tau D \tag{10}$$

where V_L and V_u are market values for the levered and the unlevered firm, respectively; τ is the marginal tax rate and D is the total debt of the firm. By allowing for growth potential, M&M [13] suggest a cross-sectional model to estimate the cost of capital as

$$\frac{V_L - \tau D}{A} = \alpha_0 \frac{1}{A} + \alpha_1 \frac{\overline{X}(1 - \tau)}{A} + \alpha_2 \frac{\overline{\Delta A}}{A} + u \tag{11}$$

where $\overline{X}$ is the expected earnings, A is total assets, and $\Delta\overline{A}/A$ is the average growth rate. $\overline{X}$ is generally not observable and the current earnings are used to replace the expected earnings. M&M suggest the proxy error problem arising from the use of X instead of $\overline{X}$ may be alleviated by using,

$$Y = \sum_{i=1}^{m} r_i Z_i + W \tag{12}$$

where $Y = \frac{X(1 - \tau)}{A}$, and the Z_i's refer to a firm's size, growth, debt, preferred stock, and dividends. If the estimated Y is used to replace $\frac{\overline{X}(1 - \tau)}{A}$, then the inverse of the estimated α_1 is the estimated cost of capital. This model assumes all firms used in estimating equation 11 belong to a single business risk class. The cost of capital estimated by this procedure is an industry cost of capital estimate. This concept and method were extended by Litzenberger and Rao [10, 11] and Higgins [6].

Capital Asset Pricing Model

The Sharpe [19]-Lintner [8] Capital Pricing Model CAPM predicts the relationship between betas and risk premiums to be:

$$E(\tilde{r}_j) = E(\tilde{r}_m)\beta_j, \tag{13}$$

where $E(\tilde{r}_j)$ and $E(\tilde{r}_m)$ are the expected excess rates of return above the riskless rate of interest for the j-th security and the market portfolio, respectively, and β_j is the beta of the j-th security as measured against the true market portfolio of all assets. The model assumes risk averse investors with homogeneous expectations, existence of a riskless asset, marketability of all assets and the absence of transactions costs and taxes.

When short selling of securities is limited, the relationship between risk premiums and betas becomes:

$$E(\tilde{r}_j) = E(\tilde{r}_m)\beta_j + E(\tilde{r}_z)(1 - \beta_j), \tag{14}$$

where $E(\tilde{r}_z)$ is the risk premium associated with the minimum variance zero beta portfolio.

Recently, Litzenberger, Ramaswamy and Sosin [9] [LRS] discussed the possible estimation bias associated with the specification of the CAPM. One important source of bias results from using the traditional CAPM instead of the after-tax version of the CAPM. The after-tax version of the CAPM may be written as:

$$E(\tilde{r}_j) = E(\tilde{r}_m)\beta_j + E(\tilde{r}'_z)(1 - \beta_j) + E(\tilde{r}_h)(d_j - \beta_j d_m), \tag{15}$$

where $E(\tilde{r}'_z)$ is the risk premium of a zero beta portfolio with a zero dividend yield, $E(\tilde{r}_h)$ is the expected return on a hedged portfolio with a zero beta and a dividend yield of unity, and d_j is the dividend yield. Comparing this more generalized cost of equity capital model with the traditional model of equation (13) shows that the traditional CAPM has three possible biases; (1) a risk free rate bias and (2) a dividend yield bias and, (3) a beta bias.

The alternative CAPM specifications as in equations (13), (14) and (15) do not explicitly consider the impact of growth on the cost of equity capital estimation. Fewings [1975] and Gordon and Gould [1978] indicate that systematic risk is a positive function of the growth rate of corporate earnings. However, Myers and Turnbull [1977] suggest systematic risk is negatively related to beta. Senbet and Thompson [1982] review

the controversy and conclude that the relationship between growth and systematic risk "depends on the way in which the response of cash flows to unanticipated changes in the economy changes with g."

Myers [15], using real option theory, argued that the estimated beta in terms of the traditional CAPM is a positive function of the proportion of the stock's value accounted for by growth in the M&M sense. That is, if the market value of a growth firm can be decomposed into a perpetual component and a growth component, the hurdle rate obtained from the traditional CAPM will be an overestimate of the correct rate for any firm having valuable growth opportunities.

Integrated Models

The DCF and CAPM methods of cost of equity capital estimation have been used in determining the required rates of return in the electric utility industry. The DCF model of share valuation in partial equilibrium emphasizes corporate characteristics such as growth while risk is consigned to a black box. The CAPM, on the other hand, provides a general equilibrium risk and return model in which everything else is consigned to a black box, hence, some integrations of the alternative cost of capital estimation methods have been made.

One method of combining M&M's formulation with the CAPM involves using the CAPM to allow for different levels of risk instead of assuming equivalent risk classes. As shown in Copeland and Weston [1, p. 293], M&M's after-tax cost of equity model is;

$$k_e = \rho + (\rho - k_d)(1 - t_c)(B/S) \tag{16}$$

where ρ is the unlevered cost of equity, k_d is the cost of debt, t_c is the corporate tax rate, and B/S is the ratio of the market value of debt to the market value of equity. Substituting

$$\rho = E(R_j) = R_f + \frac{E(R_m) - R_f}{\sigma_m} (r_{um}\sigma_u) \tag{17}$$

into equation (16) gives

$$k_e = R_f + \frac{E(R_m) - R_f}{\sigma_m} (r_{Lm}\sigma_u) + \frac{E(R_m) - R_f}{\sigma_m} (r_{Lm}\sigma_u)(1 - t_c)\frac{B}{S}, \tag{18}$$

where R_f is the risk free rate, $E(R_m)$ is the expected market return, σ_m and σ_u are the standard deviations of the expected returns of the market and the unlevered firm, and r_{Lm} is the correlation between the returns of the levered firm and the market. Other symbols are as previously defined.

In a recent study, Glenn and Litzenberger [3] used the multiperiod certainty growth model of M&M in combination with the single period capital asset pricing model. They combined a modified M&M model;

$$V_{j0} = \frac{D(X_{j1})}{K_j} + I_{j1} \frac{(\pi_j - K_j)}{K_j} T_j \tag{19}$$

with the traditional Sharpe-Lintner CAPM;

$$K_j = R_f + [E(R_m) - R_f]\beta_j, \tag{20}$$

to get;

$$\frac{E(X_{j1})}{V_{j0}} - R_f = [E(R_m) - R_f]\beta - \left[\frac{E(X_{j1})}{V_{j0}}\right] T_j(\bar{g}_j - \bar{r}_j K_j). \tag{21}$$

Here, V_{j0} is the current market value of the j-th firm's equity, $E(X_{j1})$ is the expected earnings to equity for the j-th firm in year 1, I_{j1} is

the j-th firm's equity investment expenditure in year 1, π_j is the expected rate of return on equity investment for the j-th firm, T_j is the number of years into the future that positive NPV investment opportunities are expected to be available, K_j is the j-th firms required rate of return on equity, R_f is the risk free rate, $E(R_m)$ is the expected return of the market index, and β_j is the j-th firm's beta. Equation 21 was used to estimate the market risk premium for a particular industry; then this estimated risk premium is used with equation 13 to determine the cost of equity capital for a particular firm.

IV. THE EMPIRICAL RESULTS

The main purposes of this section are: (i) to investigate the relationships among the cost of capitals obtained from $\frac{E}{P}$, k_e and R_j as indicated in equations (5), (9) and (13) respectively. In addition, the empirical results are classified into (i) utility industry and (ii) non-utility industries. This classification is used to determine how the dividend yield and grow the potential effects can affect alternative cost of capital estimations.

The Electric Utility Industry Results

Table 1 presents the means and standard deviations for three estimates of the cost of equity capital for the electric utility industry; E/P, $k_e = \frac{D_1}{P_0} + g$ and $R_j = R_f + \beta_j(R_m - R_f)$. As can be seen, the 5-year average E/P ratio increases every year, from a low of .0517 in 1966 to .1167 in 1976. This increase emerged as a result of both increased earnings per share and a lower price per dollar of earnings. The estimate of Gordon's k_e is always greater than the E/P ratio. Indeed, it

is more than double the E/P ratio in six of the years when the total growth rate proxy was over ten percent. Further, because the payout ratio is high in the electric utility industry relative to other industries, the D/P term in the model is near the E/P ratio for the electric utility industry. (The payout ratio averaged 67.5% for the ten year period). The systematic risk coefficient, beta, varied from a low of .6250 in 1968 to a high of .7852 in 1976. The excess return on the market portfolio was assumed to be 8.278% over the years of the study.[2] Changes in beta and the risk free rate caused the required return of the CAPM approach to vary from a low of .1010 in 1971 to a high of .1313 in 1974. This measure of the cost of equity was always greater than the E/P ratio but was smaller than the estimates of Gordon's Model in all but the first two years.

These results which suggest that the CAPM may underestimate the cost of equity capital in the utility industry can be explained by examining equation (15). If equation (15) instead of equation (13) is the correct specification for estimating a firm's cost of equity capital, then the signs of both $E(\tilde{r}_z')(1 - \beta_j)$ and $E(\tilde{r}_h)(d_j - \beta_j dm)$ can be used to determine whether the bias upward or downward. For firms in the electric utility industry betas are typically less than 1.0 and d_j is generally larger than $\beta_j dm$. Thus, both terms in equation (15) are positive, and the cost of equity capital obtained from equation (13) is underestimated.

Table 2 presents the correlations among the three measures for the electric utility industry. As can be seen, there are differences in

the relationships when comparing the E/P ratio with the other two measures, k_e and R. For example, the E/P ratio is not significantly related to the DCF model, k_e, while the E/P ratio is significantly related to the CAPM measure, R_j in five of the ten years.

The Industrial Firms Results

Table 3 presents the cost of equity estimates for the Textile, Chemical, and Retail Store Industries. The E/P ratio generally increases over time in all three industries. For the 1967-1976 period, the Chemical Industry exhibited the lowest E/P ratio and all three industries' E/P ratios were lower than that of the electric utility industry in every year. The k_e measure of Gordon's Model increased over time for the Textile Industry but decreased and then increased for the Chemical and Retail Store Industries. In the first seven years the Textile Industry exhibited the lowest k_e and the Chemical Industry had the lowest k_e in the later years. The electric utility industry exhibited the highest k_e in seven of the ten years for which utility data were available. The cost of equity estimate using the CAPM shows the utility industry having the lowest R in every year. The Chemical Industry's Rs are less than those of the Textile and Retail Store Industries in ten of the thirteen years.

Correlation results for the Textile Industry are presented in Table 4. As can be seen the E/P ratio is significantly related to the k_e measure in eight of the years. However, the E/P ratio is not significantly related to systematic risk in any year. k_e is significantly related to R_j in five years.

Table 5 shows the Chemical Industry results. Unlike earlier results, the E/P ratio is unrelated to both k_e and R. Also, no correlation is present between the k_e measure and the R_j measure. Table 6 shows the Retail Stores Industry results. The E/P ratio is related to k_e in five of the years, but is not related to R in any year. Again, there is an absence of correlation between k_e and R_j.

Among the four industries there is little relationship between the DCF and CAPM measures. There were no significant relationships in the Chemical and Retail Stores Industries; there were two (of ten) significant relationships in the utility industry and five (of thirteen) significant relationships in the Textile Industry.

These correlation coefficients among three alternative cost of cost of capital estimates indicates that different cost of capital estimates do not give the same rankings for firms in an industry. In addition, the correlation coefficient structure is unstable over time, giving some empirical support for Haley and Schall's [4] analytical arguments on "problems with the concept of the cost of capital."

The correlation coefficient between k_e and R_j can be analytically analyzed as follows.

$$\rho(R_j, K_{ej}) = \rho[\bar{r}_f + \beta_j(\bar{r}_m - \bar{r}_f), \frac{\bar{D}}{P_j} + g_j]$$

$$= [\mathrm{Cov}(\beta_j, \frac{\bar{D}}{P_j}) + \mathrm{Cov}(\beta_j, g_j)]/(\sigma\beta)[\sigma_k]$$

Empirically it is found that $\mathrm{Cov}(\beta_j, \frac{D}{P_j})$ is generally negative and $\mathrm{Cov}(\beta_j, g_j)$ is generally positive. The sign of ρ is dependent upon whether $[\mathrm{Cov}(\beta_j, \frac{\bar{D}}{P_j}) + \mathrm{Cov}(\beta_j, g_j)]$ is positive or negative. If $[\mathrm{Cov}(\beta_j, \frac{\bar{D}}{P_j}) + \mathrm{Cov}(\beta_j, g_j)]$ approaches zero, then the relationship

between R_j and k_{ej} will be trivial. Graphically the relationship between k_{ej} and R_j can be indicated in figure 1

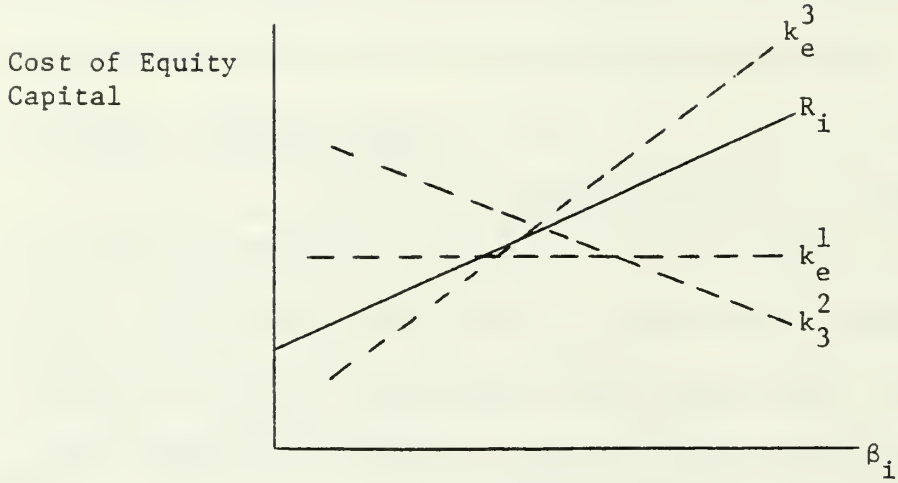

Figure 1

If k_e^1 holds, then the cost of equity capital obtained from the DCF method is unrelated to the beta estimates; if k_e^2 holds, then the DCF cost of equity capital estimate is negatively related to the beta estimate; if k_e^3 holds, then the DCF cost of equity capital is positively related to the beta estimate. Since k_e is one of the major components of weighted cost of capital, and therefore, the weighted cost of capital is not necessarily unrelated to beta as suggested by Weston [25] and Rubenstein [19].

V. Summary and Concluding Remarks

In this study, alternative costs of equity capital are reviewed and three widely used estimation methods were compared. Empirical results of these alternative cost of equity capital measures for the electric utility, the textile, the chemical, and the Retail Stores industries show wide differences in both the average industry values and standard deviations of the measures. Not only are there wide

differences across industries, but there are also wide differences over time within each industry.

Besides the differences in means and standard deviations, there were no consistent relationships among the three cost of equity estimation methods. These results indicate that firms must be cognizant of the different assumptions inherent in the different models. Growth rate biases associated with applying the CAPM to estimate the cost of equity capital for different industries must be explored in future research.

Footnotes

[1]See Sharpe [1981], pp. 381-82.

[2]This value is the expected excess return derived by Merton's [1980] Model #1. The value is higher than the historical NYSE excess return of 8.150% reported by Merton but lower than the 8.8% reported by Ibbotson and Sinquefield for the S&P 500 [1977].

References

1. Copeland, T. E. and F. J. Weston, Financial Theory and Corporate Policy, Addison-Wesley (1979).

2. Friend, I., and M. Blume (1975), "The Demand for Risky Assets," The American Economic Review (December 1975), pp. 900-922.

3. Fewigs, D. R. (1975), "The Impact of Corporate Growth on Risk of Common Stocks," Journal of Finance, 30, pp. 525-531.

4. Glenn, D. W., and R. H. Litzenberger (1979), "An Interindustry Approach to the Econometric Cost of Capital Estimation," Research In Finance, JAI Press (1979), pp. 53-75.

5. Gordon, M. J. and L. I. Gould (1978), "The Cost of Equity Capital: A Reconsideration," Journal of Finance, 23, pp. 849-861.

6. Gordon, M., (1962), "The Savings, Investment and Valuation of a Corporation," Review of Economics and Statistics (February 1962), pp. 37-51.

7. Haley, C. W. and L. D. Schall (1978), "Problems With the Concept of the Cost of Capital," Journal of Financial and Quantitative Analysis (December 1978), pp. 847-870.

8. Higgins, R. C., "Growth, Dividend Policy and Capital Costs in the Electric Utility Industry," Journal of Finance (December 1974), pp. 1189-1201.

9. Ibbotson, R. G. and R. A. Sinquefield (1977), "Stocks, Bonds, Bills, and Inflations: The Past (1926-1976) and the Future (1977-2000), The Financial Analysts Research Foundation, reprinted in Readings in Investment edited by J. C. Francis, C. F. Lee, and D. E. Farrar, McGraw-Hill Book Company, pp. 723-829.

10. Lintner, J., "The Cost of Capital and Optimal Financing of Corporate Growth," Journal of Finance, (May 1963), pp. 292-310.

11. Litzenberger, R., K. Ramaswamy and H. Sosin, "On the CAPM Approach to the Estimation of a Public Utility's Cost of Equity Capital," The Journal of Finance (May 1980), pp. 369-83.

12. Litzenberger, R. H. and C. V. Rao, "Estimates of the Marginal Rate of Time Preference and Average Risk Aversion of Investors in Electric Utility Shares: 1960-66," Bell Journal of Economics and Management Sciences, II, 1 (Spring 1971), 265-277.

13. Litzenberger, R. H. and C. V. Rao, "Portfolio Theory and Industry Estimates of the Cost of Capital," Journal of Financial and Quantitative Analysis, VII, 2 (March 1972), 1443-1462.

14. Merton, R. C. (1980), "On Estimating the Expected Return on the Market," Journal of Financial Economics (December 1980), pp. 323-361.

15. Miller, M. H. and F. Modigliani (1966), "Some Estimates of the Cost of Capital to the Utility Industry, 1954-57," American Economic Review (June 1966), pp. 333-391.

16. Modigliani, F., and M. H. Miller (1963), "Corporate Income Tax and the Cost of Capital: A Correction," American Economic Review, 53, pp. 433-443.

17. Myers, S. C. (1977), "The Relationship Between Real and Financial Measures of Risk and Return," in Risk and Return in Finance, Vol. 1, edited by Friend and Bicksler, pp. 49-80.

18. Myers, S. C. and S. M. Turnbull (1977), "Capital Budgeting and Capital Asset Pricing Model: Good News and Bad News," Journal of Finance, 32, pp. 321-333.

19. Rubinstein, M. E. (1973), "A Mean-Variance Synthesis of Corporate Financial Theory," Journal of Finance, 28, pp. 167-187.

20. Senbet, L. W. and H. E. Thompson, "Growth and Risk," Journal of Financial and Quantitative Analysis, (September 1982), pp. 331-340.

21. Sharpe, W. F., Investments, 2nd ed. Prentice Hall, Inc., Englewood Cliffs, New Jersey, 1981.

22. __________, "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk," Journal of Finance, (September 1964), pp. 425-442.

23. Van Horne, J. C. (1983), Financial Management and Policy, Prentice-Hall: Englewood Cliffs, New Jersey.

24. Vasicek, O. A. (1973), "A Note on Using Cross-Sectional Information in Bayesian Estimation of Security Beta," The Journal of Finance, 35, pp. 883-896.

25. Weston, J. F. (1973), "Investment Decision Using the Capital Asset Pricing Model," Financial Management (Spring 1973), pp. 25-33.

26. Weston, J. F. and E. F. Brigham (1981), Managerial Finance, seventh edition, The Dryden Press, Hinsdale, Illinois.

Table 1

Means and Standard Deviations for
Three Estimates of the Cost of Equity for the
Electric Utility Industry
(Standard Deviations in Parentheses)

Year	$\overline{E/P}$	k_e	R_j
1967	.0558 (.0077)	.1033 (.0169)	.1054 (.0140)
1968	.0589 (.0077)	.1119 (.0186)	.1063 (.0149)
1969	.0663 (.0088)	.1340 (.0225)	.1209 (.0140)
1970	.0713 (.0092)	.1451 (.0283)	.1252 (.0143)
1971	.0752 (.0090)	.1576 (.0330)	.1010 (.0133)
1972	.0788 (.0091)	.1657 (.0354)	.1034 (.0152)
1973	.0880 (.0088)	.1891 (.0395)	.1285 (.0157)
1974	.1031 (.0119)	.2381 (.0566)	.1313 (.0156)
1975	.1115 (.0146)	.2009 (.0388)	.1258 (.0163)
1976	.1167 (.0166)	.1905 (.0350)	.1202 (.0159)

Table 2

Correlations Among the Three
Cost of Equity Capital Measures
(Electric Utility Industry)

	E/P vs k_e	E/P vs R_j	k_e vs R_j
1967	-.057	-.016	.064
1968	-.030	-.222	-.018
1969	.132	-.254**	-.144
1970	.079	-.441*	-.094
1971	.007	-.378*	.012
1972	-.045	-.386*	.131
1973	-.091	-.382*	.158
1974	.166	-.248	.102
1975	.003	.095	.291**
1976	-.173	.222	.290**

*Significant at the .01 level
**Significant at the .05 level

Table 3

Means and Standard Deviations for Three Estimates of the Cost of Equity Capital

	Textiles (n=14)			Chemicals (n=21)			Retail Stores (n=14)		
Year	$\overline{E/P}$	k_e	R	$\overline{E/P}$	k_e	R	$\overline{E/P}$	k_e	R
1967	.050 (.022)	.076 (.067)	.142 (.029)	.033 (.019)	.150 (.037)	.156 (.02)	.041 (.022)	.138 (.059)	.128 (.021)
1968	.050 (.024)	.074 (.063)	.162 (.023)	.036 (.019)	.155 (.039)	.156 (.027)	.044 (.021)	.132 (.061)	.148 (.023)
1969	.053 (.023)	.071 (.070)	.179 (.020)	.041 (.022)	.151 (.036)	.161 (.020)	.050 (.022)	.123 (.055)	.165 (.020)
1970	.053 (.023)	.070 (.060)	.174 (.021)	.043 (.023)	.142 (.037)	.160 (.021)	.053 (.022)	.116 (.032)	.170 (.025)
1971	.047 (.022)	.077 (.037)	.159 (.018)	.041 (.021)	.131 (.031)	.140 (.023)	.050 (.019)	.103 (.035)	.153 (.026)
1972	.052 (.023)	.088 (.031)	.160 (.021)	.044 (.023)	.124 (.031)	.138 (.024)	.054 (.021)	.102 (.036)	.158 (.025)
1973	.076 (.023)	.100 (.040)	.188 (.021)	.055 (.030)	.102 (.026)	.169 (.023)	.069 (.028)	.103 (.037)	.195 (.027)
1974	.087 (.064)	.115 (.043)	.166 (.020)	.072 (.040)	.093 (.030)	.164 (.024)	.085 (.034)	.107 (.038)	.179 (.019)
1975	.087 (.061)	.111 (.043)	.157 (.028)	.080 (.046)	.100 (.040)	.150 (.014)	.096 (.041)	.115 (.031)	.172 (.017)
1976	.105 (.068)	.128 (.048)	.153 (.029)	.091 (.047)	.114 (.039)	.147 (.012)	.104 (.042)	.133 (.038)	.156 (.019)
1977	.089 (.118)	.144 (.049)	.156 (.028)	.103 (.046)	.125 (.042)	.148 (.013)	.111 (.042)	.147 (.054)	.159 (.021)
1978	.090 (.119)	.146 (.055)	.166 (.027)	.112 (.042)	.132 (.060)	.162 (.014)	.117 (.036)	.153 (.075)	.166 (.018)
1979	.084 (.138)	.134 (.051)	.209 (.031)	.114 (.029)	.131 (.067)	.193 (.018)	.116 (.034)	.154 (.083)	.204 (.023)

Table 4

Correlations Among the Three
Cost of Equity Capital Measures
(Textiles)

	E/P vs k_e	E/P vs R_j	k_e vs R
1967	-.128	.442	.193
1968	-.167	-.033	.249
1969	.038	-.154	-.021
1970	.313	-.109	.338
1971	.374	.142	.443
1972	.535**	.221	.518**
1973	.532**	.226	.510
1974	.545**	.184	.562**
1975	.737*	.374	.399
1976	.852*	.398	.641*
1977	.816*	.460	.692*
1978	.868*	.326	.409
1979	.817*	.425	.542**

*Significant at the .01 level
**Significant at the .05 level

Table 5

Correlations Among the Three
Cost of Equity Capital Measures
(Chemicals)

Year	E/P vs k_e	E/P vs R_j	k_e vs R
1967	.176	-.066	.159
1968	.038	-.003	.270
1969	-.220	-.031	.170
1970	-.363	-.205	.238
1971	-.300	-.231	.160
1972	-.312	-.275	.422
1973	-.077	-.321	.251
1974	-.195	-.376	-.047
1975	-.032	-.109	-.206
1976	.060	-.136	.097
1977	.215	-.119	.124
1978	.154	-.065	.016
1979	.110	-.047	.095

*Significant at the .01 level
**Significant at the .05 level

Table 6

Correlations Among the Three
Cost of Equity Capital Measures
(Retail Stores)

	E/P $\underline{k_e}$	E/P $\underline{R_j}$	k_e $\underline{R_j}$
1967	.458	-.033	.213
1968	.549**	.117	.197
1969	.439	-.001	.105
1970	.523**	-.178	-.494
1971	.017	-.160	-.379
1972	-.387	-.175	-.330
1973	-.460	-.222	-.073
1974	-.497	-.128	-.026
1975	-.432	-.266	.125
1976	.108	-.274	-.097
1977	.564**	-.206	-.124
1978	.619**	-.338	-.405
1979	.670*	-.243	-.400

*Significant at the .01 level
**Significant at the .05 level

Table 7

Means and Standard Deviations of Beta

Year	Utilities	Textiles	Chemicals	Retail Stores
1967	.704 (.176)	1.152 (.355)	1.310 (.330)	.982 (.254)
1968	.625 (.178)	1.301 (.280)	1.288 (.243)	1.131 (.280)
1969	.640 (.168)	1.348 (.274)	1.244 (.255)	1.173 (.245)
1970	.730 (.171)	1.322 (.250)	1.145 (.284)	1.272 (.297)
1971	.656 (.160)	1.352 (.223)	1.130 (.294)	1.288 (.317)
1972	.673 (.182)	1.360 (.260)	1.091 (.275)	1.332 (.303)
1973	.705 (.188)	1.421 (.249)	1.169 (.292)	1.511 (.321)
1974	.656 (.188)	1.080 (.245)	1.052 (.169)	1.229 (.229)
1975	.762 (.196)	1.139 (.338)	1.057 (.151)	1.314 (.201)
1976	.785 (.191)	1.179 (.353)	1.108 (.158)	1.223 (.226)
1977	NA	1.193 (.336)	1.097 (.171)	1.231 (.250)
1978	NA	1.075 (.330)	1.018 (.228)	1.068 (.212)
1979	NA	1.342 (.375)	1.153 (.228)	1.287 (.274)